

Remarks

Claims 1 and 3-20 are pending in this application. A request for continued examination is filed herewith.

Claims 1 and 18 have been amended to better define aspects of embodiments of the invention including the process for determining the source region from the destination region. Support for the amendments is provided at least by paragraph 40 of the application. Claims 4 and 10 have been amended to correct typographical errors. Claim 11 has been amended to its original wording in the application, as filed. Claim 11 has also been amended to specify the position of the first color region and the second color region in a fashion corresponding to the position definition in Claim 5. Claim 15 has been rewritten to include the limitations of original Claims 13 and 14. Claim 13 has been rewritten to depend from Claim 1. Claim 20 has been amended to clearly state in which operation of the parent claim the color ratio is applied. This operational flow is described at least in paragraph 63 of the application, as filed. No new matter has been added.

Claim Rejections – 35 U.S.C §103(a)

Claims 1 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Anandan et al., (US 6,198,852) and further in view of Gawronski et al. (U.S. 6,073,056.)

The rejections of Claims 1 and 18 for obviousness must fail for at least the following reasons:

1. There is no motivation to combine Gawronski's method for creating a physical part with Anandan's 3D-to-2D projective transformations because Gawronski's method would then be unable to create a 3D physical part. Thus, a prima facie case of obviousness has not been made.
2. No showing has been made that Gawronski's individual 3D process steps would work at all if Gawronski's 3D point data, 3D coordinate data and 3D models were projected onto a 2D image plane by Anandan's transformations. Claims 1 and 18 require a series of process steps performed on a 2D image. Thus, required limitations of Claims 1 and 18 are not taught by the combination of references and a prima facie case of obviousness has not been made.
3. Including step "f" of Claims 1 and 18, "painting in the 2D image by copying the transformed 2D image information to the destination region," in Gawronski's process makes the process unsuitable to produce the output of Gawronski's process, whether a physical part or a two-dimensional printout of a layer of the part, because it would require one portion of the part to overwrite another portion of the part.

Details are provided below:

1. There is no motivation to combine Gawronski's method for creating a physical part with Anandan's 3D-to-2D projective transformations.

The rejection of Claims 1 and 18 for obviousness over Gawronski '056 and Anandan '852 must fail, *inter alia*, because no convincing teaching, motivation or suggestion has been cited to combine these references to achieve the embodiments of these claims. Thus, a prima facie case of obviousness has not been made. (See, MPEP 2143.01)

Gawronski '056 discloses building a data model of a physical part in a data format useful for reproduction of the part. The system preferably includes a Moire interferometry system including a camera mounted on a portable coordinate measuring system (CMM) to obtain high density data scans in the form of 3-D point data from different positions and orientations of the interferometry system relative to the part. The CMM provides position data to enable an engineering workstation to convert the data scans obtained in multiple local coordinate systems into a single global coordinate system. The engineering workstation then integrates the data scans in the global coordinate system and joins the point data to form a polygonal structure corresponding to multiple continuous surfaces of the physical part. From this data, a tool path can be generated to cut a reproduction of the part or a mold for molding the reproduction. (See Gawronski '056, Abstract.)

Anandan et al. '852 teaches synthesizing a 2D image corresponding to a new viewpoint of a scene. This new 2D image is synthesized from at least two

existing images of the scene taken from different respective viewpoints. (See, Anandan '852, abstract, first paragraph.)

The Office Action states on page 7 that:

"Therefore it would have been obvious to one of ordinary skill in the art to perform "copying the transformed image information to the destination region" in view of Gawronski's teaching of "integrate the first and second sets of 3-D points data in the global coordinate system to obtain the data model of the physical part in the data format in combination with projecting a 3D world onto a 2D projection plane as disclosed by Anandan and **motivated to combine the reference because given a projective coordinate system specified by 5 basis points, the set of constraints directly relating the projective coordinates of the camera centers to the image measurements (in 2D projective coordinates).**" (emphasis added.)

While Anandan may teach projecting a 3D world onto a 2D projection plane, such a projective process is inapposite to Gawronski's method. No showing has been made that projecting the 3D world of Gawronski's method onto a 2D projection plane provides any advantage to Gawronski's method of creating a model of a 3D part. Certainly, the only motivation cited by the Office Action – the bolded words above – speaks only to how Anandan performs 3D-to-2D projections, not why one would want to perform this projective step in combination with Gawronski's method. In fact, projecting Gawronski's 3D coordinates at each step of Gawronski's process into a 2D coordinate system would render Gawronski's method for creating the data model unsatisfactory for its intended purpose. (In fact, we explain below why such a combination would not in fact work.) There is, therefore, no suggestion or motivation to make the proposed modification. See, e.g., MPEP § 2143.01, Section V. Because a suggestion or motivation to modify Gawronski is needed to make a

prima facie case of obviousness, Claim 1 cannot be deemed obvious over Gawronski '056 in combination with Anandan '852.

Claim 18 includes limitations similar to the limitations cited for Claim 1. Claim 18 is deemed non-obvious over Gawronski '056 in combination with Anandan '852 for at least the same reasons as for Claim 1.

Each of the obviousness rejections for Claims 3-10, 13-14; and 19-20, relies on Gawronski '056 and Anandan '852 for teaching the limitations of Claims 1 and 18, from which these claims depend. As shown above in connection with Claims 1 and 18, there is no motivation to modify the teachings of Gawronski with the teachings of Anandan because Gawronski's method would then be unsuitable for its intended purpose. The cited secondary references provide no motivation or suggestion to combine Anandan and Gawronski. Because no convincing motivation or suggestion to combine Gawronski '056 and Anandan '852 has been cited, a prima facie case of obviousness has not been made for Claims 3-10, 13-14, and 19-20. Therefore, Claims 3-10, 13-14; and 19-20 are deemed allowable over the cited references.

2. No showing has been made that Gawronski's individual 3D process steps would work at all if Gawronski's 3D point data, 3D coordinate data and 3D models were projected onto a 2D image plane by Anandan's transformations. Claims 1 and 18 require a series of process steps performed on a 2D image.

Gawronski's method deals exclusively in 3D point data, 3D coordinate spaces, and 3D models formed from polygons. (See, e.g., Gawronski, Abstract.)

Each of the limitations of Claims 1 and 18 requires method steps performed on a 2D image. No showing has been made that Gawronski's method would work if the 3D point data, 3D coordinate data and 3D models were each projected onto a 2D image plane at each step of Gawronski's process. For example, any surfaces of the part that overlap when projected onto a 2D plane would be corrupted in the final model. Such overlap of surfaces is inevitable due to the impreciseness of the scanning process in Gawronski's method. Accordingly, Applicants submit that Gawronski's method would not work under circumstances wherein the 3D coordinate data are projected onto a 2D image plane at each step of Gawronski's process. Examiner is requested to withdraw the rejections of Claims 1 and 18 for obviousness. Alternatively, should the rejections be maintained, pursuant to 37 C.F.R. § 104(d)(2), applicants hereby request an affidavit from the Examiner setting forth the basis for Examiner's assertion that each process step in Claims 1 and 18 operating on a 2D image would be taught individually by combining Gawronski with Anandan and that the resulting process would produce any useful result.

See MPEP § 2144.03(C). Applicants request that such affidavit relate to the state of the art as of the effective filing date of the present application. Applicants furthermore traverse the obviousness rejections for Claims 3-10, 13-14, and 19-20 for analogous reasons.

Applicants note that the advisory action of 4/24/2007 points to Claims 14, 15 and 33 and 34 of Gawronski '056 to support these rejections. The Claims recite process steps of Gawronski that require that the 3D data model

created as the output of the method steps of Gawronski '056, Claim 1, be further processed to create a 2D output. Applicants note that projecting a 3D data model onto a 2D surface does not meet the limitations of Claims 1 (or Claim 18) which require 2D data as the work piece at each step of the process.

3. Including step "f" of Claims 1 and 18, "painting in the 2D image by copying the transformed 2D image information to the destination region," in Gawronski's process makes the process unsuitable to produce a physical part or a printout of a layer of a physical part, since this step would require one portion of the part to overwrite another portion of the part.

Claim 1 requires in part:

"f) painting in the 2D image by copying the transformed 2D image information to the destination region."

Gawronski '056 does not teach copying image information from a source region of the image to a destination region of the image. Instead, Gawronski teaches mapping points on individual 3D surfaces of a physical part to a global coordinate system. First and second sets of 3D point data are then obtained. (See, Gawronski '056, col. 2. lines 40-55.). The 3D point data sets corresponding to the individual 3D surfaces are integrated to "obtain the data model of the physical part in the data format." (See, Gawronski '056, col. 2. lines 40-55.) Gawronski does not teach copying image information from one portion of the image (source region) to another portion of the image (destination region) because such an operation would obliterate point data in the

destination region. Thus, the data model created would not correspond to the physical part from which the data model is created. (See, Gawronski '056, col. 2, lines 8-12, which states that an object of his invention is to build a data model of a physical part for reproduction of the part).

Because modification of Gawronski's process to copy 3D point data from one region to another region in creating the data model would render the process unsatisfactory for its intended purpose, there is, therefore, no suggestion or motivation to make the proposed modification. See, e.g., MPEP § 2143.01, Section V. Such a suggestion or motivation to modify is needed to make a prima facie case of obviousness. Thus, claim 1 cannot be deemed obvious over Gawronski '056, since a prima facie case of obviousness has not been made. Applicants traverse the obviousness rejections for Claims 3-10, 13-14; and 19-20 for analogous reasons.

Applicants note that the above stated grounds for traversing the obviousness rejections and the rationale cited in the Office Action, while sufficient to overcome the rejections, are not exhaustive. Applicants reserve the right to further traverse these rejections in a future response, if required. Any argument not made here should not be deemed to be waived.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as obvious over Anandan and Gawronski and further in view of Suzuki et al. (US pat. no. 5,475,507.)

Claim 11 of the subject application, as amended, requires (in part):

“11. ... c) computing a color ratio between the first color sample region and the second color sample region...

....h) applying the color ratio to 2D image information of the source region and transforming the 2D image information of the source region to 2D image information of the destination region; and i) painting by copying the transformed 2D image information to the destination region.”

Suzuki '507 teaches a method of extracting an object from an image by determining boundary points on the contour of an object and using the boundary points to outline the object's contour. (See Suzuki '507, abstract.) One method used by Suzuki to outline the object's contours is to identify the color of the background and the color of the object and then to form a ratio between the two colors at points near a boundary of the object, normalized to the range (0,1). Points where the ratio equals 0.5 correspond to equal parts background color and object color and should be points on the boundary contour of the object. (See, Suzuki '507, col. 10, line 66 to col. 11, line 21.)

Suzuki, however, does not teach “applying the color ratio to 2D image information of the source region and transforming the 2D image information of the source region to 2D image information of the destination region; and i)

painting by copying the transformed 2D image information to the destination region" as required by Claim 11, as amended. The office action (page 9, para. "A") equates Suzuki's object to the first color region in the source region and Suzuki's background to the second color region in the destination region. The office action further states that Suzuki's process corresponds to the Claim 11 step of "apply the color ratio to the image information of the source region." Applicants respectfully traverse this statement because Suzuki does not teach applying the color ratio to any region of Suzuki's object or background, but rather, uses the computed color ratio to identify boundary locations in Suzuki's image for object extraction purposes. Since Suzuki's process merely identifies points in the image rather than adjusting the color of a region of the image, Suzuki does not teach a required limitation of Claim 11. Because neither Gawronski nor Anadan teaches this required limitation of Claim 11, a prima case of obviousness has not been made for Claim 11 and Claim 11 is deemed allowable over the art of record in this case. Claim 12, which depends from Claim 11 and adds further limitations, is deemed non-obvious over the cited art for at least the same reasons as Claim 11.

Claim Objections

Claims 15-17 stand objected to as being dependent upon a rejected base Claim, but would be allowable if rewritten with all of the limitations of the base claim from which these claims depend. Claims 15-17 have been rewritten to include the limitations of original claims 13 and 14 from which Claims 15-17 formerly depended. Thus, Claims 15-17 are in condition for allowance.

Conclusion

Applicants request reconsideration of all pending Claims and a notice of allowance. The Examiner is requested to telephone the undersigned if any matters remain outstanding so that they may be resolved expeditiously. The Commissioner is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 19-4972.

Respectfully submitted,

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